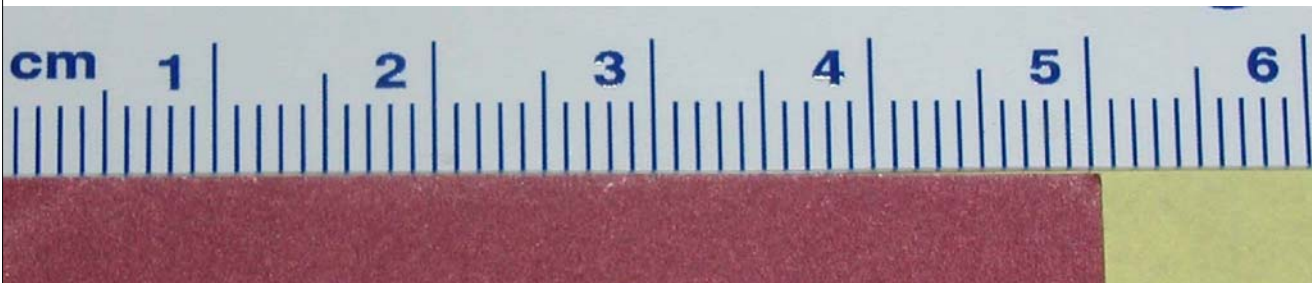


A. Measurement and Calculations:

You should be able to measure the length of an object or volume of a liquid to the appropriate number of significant figures based upon the measuring instrument.



Which of the following best expresses the width of the business card?

- a. 5 cm b. 5.0 cm c. 5.05 cm d. 5.50 cm

2. Demonstrate proficiency in the use of scientific notation and use of dimensional analysis (factor label) in metric conversions.

Know the meaning of the following metric prefixes and be able to make conversions utilizing them.: milli-, centi-, kilo-

Complete the indicated conversions:

$$a. 37 \text{ g} \times \frac{1000 \text{ mg}}{1 \text{ g}} = 37000 \text{ mg}$$

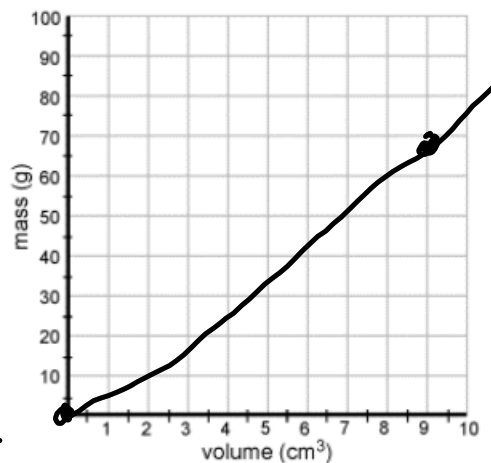
$$b. 138 \text{ m} \times \frac{1 \text{ km}}{1000 \text{ m}} = 0.138 \text{ km}$$

$$c. 4.7 \text{ kg} \times \frac{1000 \text{ g}}{1 \text{ kg}} = 4700 \text{ g}$$

$$d. 4021 \text{ mm} \times \quad = \quad \text{m}$$

4. Determine the density of an object from a data table or from a graph of mass vs volume.

Volume (cm ³)	Mass (g)
1.5	11.7
3.0	24.0
4.5	35.1
6.0	48.0
7.5	58.5
9.0	70.0



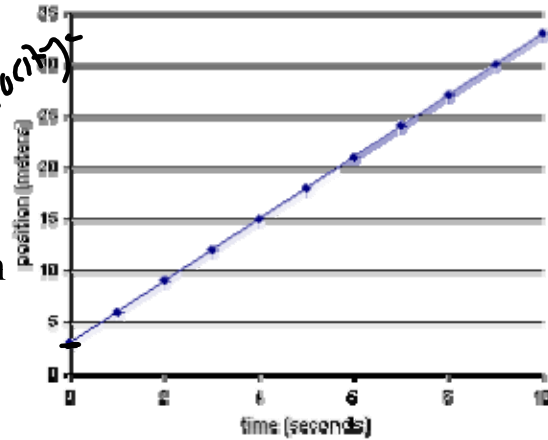
$$\frac{\text{mass}}{\text{Volume}} = \text{density} \quad \frac{70\text{g}}{9\text{cm}^3} = \frac{8\text{g}}{\text{cm}^3}$$

Plot the data above and determine the density of the substance. What volume would 150g of the substance occupy?

$$150\text{g} \times \frac{1\text{cm}^3}{8\text{g}} = 18.8\text{cm}^3$$

1. What are the units of the slope of the position vs. time graph to the left? What does the slope tell us about the object's motion?

$\frac{\text{distance}}{\text{time}} = \text{velocity}$
 $\frac{m}{s} = \text{velocity}$



2. If an object travels 20 meters in 4 seconds, what is the object's velocity?

$$\frac{20m}{4s} = 5m/s$$

$$\frac{30m}{10s} = 3m/s$$

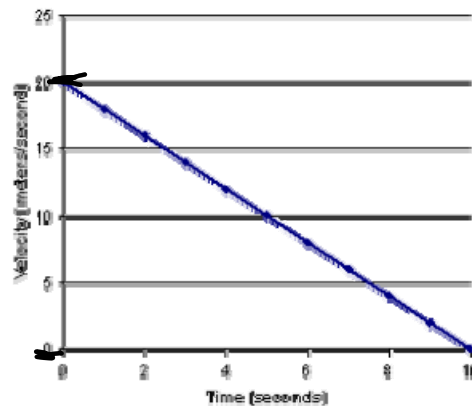
3. What is the difference between distance and displacement?

↓
 total length of path

↓
 difference between your initial and final position

4. What are the units of the slope of the velocity vs. time graph to the right? What does the slope tell us about the object's motion?

$\frac{\text{velocity}}{\text{time}} = \frac{m/s}{s} = m/s^2$ acceleration



5. If an object is accelerating at 2 m/s² from rest, how long will it take for the object to be traveling at a velocity of 5 m/s?

$$\frac{-20m/s}{10s} = -2m/s^2$$

6. What is the difference between +, -, and constant acceleration

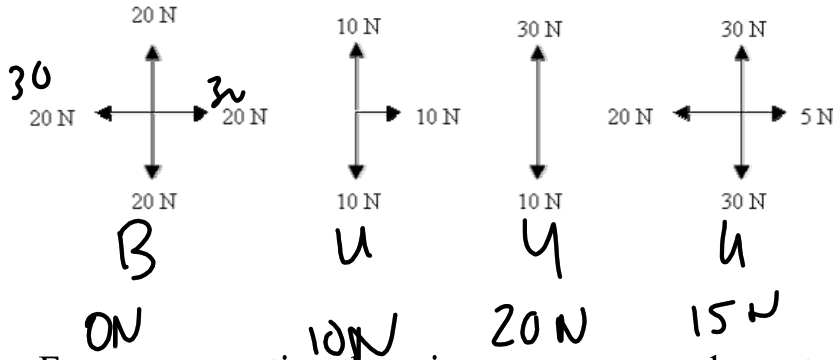
- + = speeding up
- = slowing down
- 0 = constant speed

C. Forces

1. What is a force?

causes change in movement

2. For each force diagram below (a) tell whether it is balanced or unbalanced (b) tell whether it is accelerating or staying at the same velocity (c) calculate the net force



1. For every reaction there is an equal and opposite reaction. So if you apply a force of 30N to a table, the table applies a force of 30N to you

2. How is acceleration effected by the force and mass of an object?

\uparrow force = acc \uparrow mass \uparrow = acc \downarrow

3. How do you calculate the force caused by a 2kg bowling ball accelerating at 5 m/s²?

$F = ma$ $F = 2kg \times 5m/s^2 = 10N$

4. What would its new acceleration be if you doubled the force on the bowling ball in #7?

10 m/s²

5. How does the gravitational force between two objects change with mass and distance?

mass \uparrow = gravity \uparrow
 distance \uparrow = gravity \downarrow

D. Energy

1. What is kinetic energy, how do you calculate it?

energy of movement $KE = \frac{1}{2} \cdot m \cdot v^2$

2. If an object has a mass of 10 kg and a velocity of 2 m/s, how much kinetic energy does it have?

$$KE = \frac{1}{2} (10 \text{ kg}) (2 \text{ m/s})^2$$

$$\frac{1}{2} (10 \text{ kg}) (4 \text{ m}^2/\text{s}^2) = 20 \text{ J}$$

3. What is potential energy, how do you calculate it?

energy of position $PE = mgh$ $g = 9.8 \text{ m/s}^2$

4. If the same object from #2 is 20 m from the ground, how much potential energy does it have?

$$PE = 10 \text{ kg} (9.8 \text{ m/s}^2) (20 \text{ m}) = 1960 \text{ J}$$

5. How do you calculate mechanical energy?

$$ME = KE + PE$$

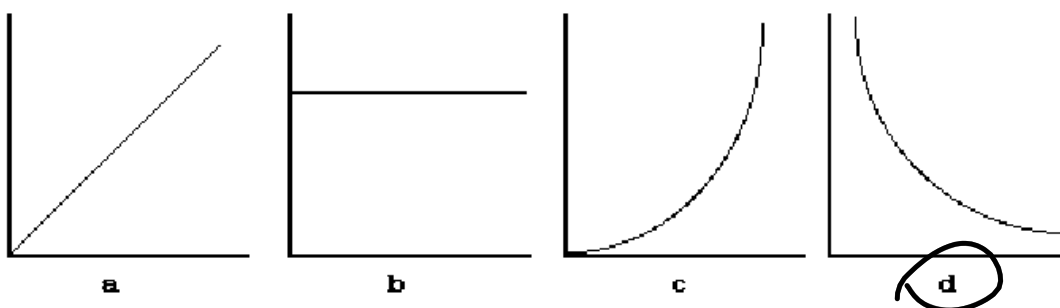
6. How much mechanical energy does the object from #2 and #4 have?

$$ME = 20 \text{ J} + 1960 \text{ J} = 1980 \text{ J}$$

7. What does the law of conservation of energy state?

we always have the same amt of energy

8. Friction changes mechanical energy into thermal energy.



1. Which graph describes the relationship between gas pressure and volume?

D pressure \uparrow = volume \downarrow

2. Which graph describes the relationship between gas pressure and temperature?

A pressure \uparrow = temp \uparrow

3. A sample of carbon dioxide has a volume of 2.0 L at a temperature of -10°C . What volume will this sample have when the temperature is increased to 110°C . Assume that the pressure does not change and that no carbon dioxide leaks from the sample.

$T \uparrow$ $V \uparrow$

$$2.0 \text{ L} \times \frac{383}{263} =$$

F. Temperature, Phase Change, and Energy

1. Define the following terms:

Thermal energy – energy of particle motion – effects temperature

Interaction energy – energy used to break attraction b/w particles – effects phase of matter

2. Explain why the alcohol level in a thermometer rises when it is placed in a warmer fluid. (3-step process)

- ① particles gain energy
- ② particles speed up
- ③ particles expand

Describe what happens (at the molecular level) when a glass of cold water warms up to room temperature.

particles gain energy from surroundings, particles move faster.